



Department of the Air Force  
HQ AEDC (AFMC)  
Arnold AFB, TN 37389

## Safety, Health, and Environmental Standard

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**Title:** Identification of Piping Systems

**Standard No.:** D3

**Effective Date:** 9/30/02

The provisions and requirements of this standard are mandatory for use by all AEDC personnel engaged in work tasks necessary to fulfill the AEDC mission. Please contact your safety, industrial health and/or environmental representative for clarification or questions regarding this standard.

Approved:

  
Contractor ESHQ Services Director  
AEDC

  
Air Force Functional Chief



Record of Revision	
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# Safety, Health, and Environmental Standard

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## IDENTIFICATION OF PIPING SYSTEMS

### 1.0 INTRODUCTION/SCOPE/APPLICATION

This standard addresses the identification of piping or tubing of any kind, including fittings, valves, and pipe coverings. Rigid electrical conduit is considered piping, whereas buried piping is excluded.

### 2.0 BASIC HAZARDS/HUMAN FACTORS

Piping systems that are unidentified could pose hazards to employees who would take precautions otherwise. Hazards include flammable or toxic materials (natural gas or JP fuels), temperature extremes (steam or hot engine exhaust), asphyxiation (gaseous nitrogen and other inert gases) and electrical hazards such as exposure to high voltage.

### 3.0 TERMS EXPLAINED

Piping Systems -- Piping or tubing of any kind including fittings, valves, and pipe coverings.

### 4.0 REQUIREMENTS

#### 4.1 Identification

4.1.1 Piping systems must be identified uniformly based on either ANSI Standard A13.1, *Scheme for the Identification of Piping Systems*, or MIL-STD-1247, *Identification of Pipe, Hose, and Tube Lines for Aircraft, Missiles, and Space Systems*.

4.1.2 Plant and test equipment piping up to the point of interface with the piping leading to a test article must be identified in accordance with the method described below.

4.1.3 Piping from the point of interface must be identified according to MIL-STD-1247, *Markings, Functions and Hazard Designations of Hose, Pipe, and Tube Lines for Aircraft, Missile and Space Systems*, which is available from the Technical Library.

4.1.4 Each valve must bear the manufacturer's name or trademark and the reference symbol to indicate the service conditions for which the valve was designed. (See Safety Standard D2, *Pressure Vessels & Systems*, and Engineering Standard T-3, *Engineering Design and Drafting Practices*, for identification of components of pressure systems.)

4.1.5 Piping that presents a bumping or tripping hazard must be marked with black and yellow stripes at the point of hazard. (See Safety, Health and Environmental Standard B10, *Safety Signs & Markers*.)

4.1.6 Piping and components in a system used to store or transfer highly hazardous chemicals identified in OSHA 1910.119, *Process Safety Management of Highly Hazardous Chemicals*, must be identified such that the on-going integrity of the system may be verified throughout the expected life of the system.

## 4.2 Color Band

4.2.1 Every pipe must be marked with a color band as listed below.

NOTE: Where many tubes are routed in a bundle, a single identification band around the bundle or a tag wired to the bundle is sufficient if all lines in the bundle contain similar materials and pressures.

4.2.1.1 Fire Protection (Red) - Piping systems that convey fire protection and like materials, including sprinkler systems and all other fire fighting systems,

4.2.1.2 Dangerous Materials (Yellow) - Piping systems that convey dangerous materials that are in themselves hazardous to life or property by virtue of pressure, temperature, flammability, toxicity, or asphyxiating properties.

4.2.1.3 Safe Materials (Green) - Piping systems that convey safe materials that involve no hazard in their handling and are of no extraordinary value.

4.2.1.4 Electrical Wiring (Orange) - Piping systems that convey electrical wiring such as light, power, telephone, alarm, and signal conduits.

## 4.3 Band Location

4.3.1 Color bands should be located at conspicuous places, preferably adjacent to valves, point of exit or entrance to areas, and on long runs at distances sufficient to identify contents readily. Color bands must be applied to the outside cover of insulated piping.

4.3.2 When a color band placed on the piping will be obscured by frost or other material, a metal tag must be substituted, mounted above or below the piping, whichever is most conspicuous (see Annex A). The tag should meet color, legend, and width requirements of a color band.

4.3.3 Paint, tape, or decal identification markings must not be placed directly on stainless steel or aluminum piping unless specified by the manufacturer to be compatible (non-corrosive) with piping material. Tygon, or metal tags fastened by wire, may be used.

## 4.4 Identity of Contents

4.4.1 Each color band must bear the name of the material or its abbreviation as shown in Annex A. For abbreviation of materials not listed, consult contractor safety.

## 4.5 Flow

4.5.1 At each color band (except for conduit), the fluid's direction of flow must be indicated by an arrow.

## 4.6 Electrical

4.6.1 Color bands on electrical conduits must be marked **ELECTRIC**.

#### 4.7 Pressure

4.7.1 Where desirable for tracing or other purposes, the working pressure in pounds per square inch (psi) should be shown below or beside the identity word.

#### 4.8 Lettering and Numbering Specifications

4.8.1 Letters and numbers placed on color bands must conform to the following (see Annex A for typical band installation):

Outside Diameter of Pipe or Covering	Minimum Size of Legend, Letters, and Numerals
Less than 3/4"	See Par. 4.8.2 below
3/4" to 1-1/4"	1/2"
1-1/2" to 2"	3/4"
2-1/2" to 6"	1-1/4"
Over 6"	2"

NOTE: Width of color band will be a minimum of 6 inches, but banding will be sufficient to accommodate lettering

4.8.2 Abbreviations for the content word for piping under 3/4-in. outside diameter must be stamped or stenciled on a nonferrous tag securely fastened at each color band or an equivalent method must be used.

4.8.3 The lettering must be placed below the horizontal centerline of the pipe where pipelines are located some distance above the normal line of vision.

4.8.4 Lettering should be in the color combination listed below. If paint is used, it should conform to specifications in the Department of the Army, Corps of Engineers Manual CE-250, *Painting*.

Lettering Color	Band Color
White (I 7875)	Red (I 1 1 05)
Black (17038)	Yellow (13655), Orange (12246), Green (141 10)

4.8.5 In shops, offices, laboratories, or other areas where the interior is painted in accordance with company standards, piping colors may match walls, ceiling, etc., to which the pipelines are affixed or are run adjacent thereto, but must be color-banded as above.

4.8.6 In test areas where interiors are not painted, piping colors may match the color of the machine, tank, or equipment from which piping leaves when on operating floors; or piping colors may match the dueling or general color scheme in auxiliary areas. But in both cases, piping must be color-banded as above.

## 4.9 Tanks and Vessels

4.9.1 Tanks and vessels, when considered as part of the piping system, must have contents identified on an appropriately sized rectangle using lettering and background coloring consistent with those used in piping identification.

4.9.2 Tanks and vessels that contain flammable material must be appropriately marked with signs that read, FLAMMABLE - NO SMOKING, MATCHES, OR OPEN LIGHTS.

4.9.3 Tank vehicles must be marked in accordance with Air Force T.O. 36-1-3, *Painting, Marking and Lighting Requirements for US Air Force Vehicles*.

4.9.4 Vessels that remain empty for a considerable period of time between tests should be marked EMPTY and have necessary precautions for opening the tank.

## 5.0 REFERENCES

AEDC Safety, Health and Environmental Standard D2, Pressure Vessels and Systems

AEDC Safety, Health and Environmental Standard D4, Compressed Gas Cylinders

AEDC Safety, Health and Environmental Standard B2, Lockout Tagout - LOTO

AEDC Safety, Health and Environmental Standard B3, Control of Hazardous Areas

AEDC Safety, Health and Environmental Standard B10, Safety Signs & Markers

ANSI Standard A13.1 - Scheme for the Identification of Piping Systems

MIL-STD 1247 - Markings, Functions and Hazard Designations of Hose, Pipe, and Tube Lines for Aircraft, Missile and Space Systems.

Army Corps of Engineers Manual CE-250, Painting

Air Force Technical Order 36-1-3 - Painting, Marking and Lighting Requirements for US Air Force Vehicles

AEDC Engineering Standard T-3, Engineering Design and Drafting Practices

OSHA 1910.119 Process Safety Management of Highly Hazardous Chemicals

## Annex A

### CONTENT IDENTIFICATION

Material in Pipe	Abbreviation	Band Color
Air Compressed	Air	Yellow
Alcohol	ALCOHOL	Yellow
Alcohol-Water Mix	ALCOHOL-Water	Yellow
Alkalies	ALKALIES	Yellow
Ammonia	AMMONIA	Yellow
Ammonia Hnhydrous	AMMONIA GAS	Yellow
Aniline	ANILINE	Yellow
Argon	ARGON	Yellow
Backwash Water	Water, BW	Brown
Brine	BRINE	Green
Carbon Dioxide	C02	Red
Chlorine Trifluoride	CLF3	Yellow
Contaminated Groundwater	GW CONT	Light Green
Drainage	DRAINAGE	Green
Electricity	ELECTRIC	Orange
Ethylene Glycol	ETHYL- GLYCOL	Yellow
Ethylene Glycol and water	ETHYL-GLYWATER	Yellow
Ethylene Oxide	ETHYLOXIDE	Yellow
Exhaust Gas	EXH-GAS	Yellow
Finished Water	WATER, FW	Dark Blue
Fluorine	FLUORINE	Yellow
Freon (11, 12, etc.)	FREON (II, 12, etc.)	Yellow
Gasoline	GASOLINE	Yellow
Halon	HALON	Red
Helium, Gaseous	GHe	Yellow
Helium, Liquid	LHe	Yellow
Hydraulic Oil	HYD-OIL	Yellow
Hydrazine Hydrate (45%) Ethyl Alcohol (50%) Water (5%)	C-staff	Yellow
Hydrazine, Unsymmetrical Dimethyl Hydrazine	UDMH	Yellow
Unsymmetrical Dimethyl Hydrazine (50%) Mix	AZ-50	Yellow
Hydrogen, Gaseous	GH2	Yellow
Hydrogen, Liquid	LH2	Yellow

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## Annex A

### CONTENT IDENTIFICATION (continued)

Material in Pipe	Abbreviation	Band Color
Hydrogen Peroxide	HYDR-PEROX	Yellow
JP Fuel	JP (N0.)	Yellow
Kerosene Liquified Petroleum Gas	KEROSENE	Yellow
Lubricating Oil	LUB-OIL	Yellow
Monomethyl-hydrazine	MMH	Yellow
Natural Gas	NAT-GAS	Yellow
Nitric Acid, Inhibited Red Fuming	IRF NITRIC ACID	Yellow
Nitric Acid, Inhibited White Fuming	ACID	Yellow
Nitric Acid, Red Fuming	RF NITRIC ACID	Yellow
Nitric Acid, White Fuming	ACID	Yellow
Fuming	ACID	Yellow
Nitrogen, Gaseous	GN2	Yellow
Nitrogen, Liquid	LN2	Yellow
Nitrogen Tetroxide	N2O4	Yellow
Oxygen Difluoride	OF2	Yellow
Oxygen, Gaseous	GO2	Yellow
Oxygen, Liquid	LO2	Yellow
Propane	PROPANE	Yellow
RP Fuel	RP (No.)	Yellow
Sewage	SEWAGE	Yellow
Sodium-Potassium	NaK	Yellow
Alloy Solvents	Specific chemical name	Yellow
Steam Toluene	STEAM TOLUENE	Yellow
Treated Water	WATER TREATED	Light Blue
Trichloroethylene	TRICHLOR-ETHY	Yellow
Triethylaluminum	TEA	Yellow
Water Demineralized	WATER-DEM	Green
Water, Fire Line	WATER FIRE	Red
Water, Potable Cold or Hot	WATER POT (Cold or Hot)	Green
Water, Raw (Cooling), Cold or Hot	WATER,RAW (Cold or Hot)	Green
Xylidine (50%)	TONKA	Yellow

**NOTE:** For other than fire protection purposes (for example, pressurization for transfer of fluid), CO<sub>2</sub> lines must be color-banded yellow, in view of asphyxia hazard.

## Annex B

## Band and Tag Locations

